



8-Range Multitester



Owner's Manual
Please read before using this equipment.

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

Features

Your RadioShack 8-Range Multitester is a perfect addition to your workshop. It is designed with a precision meter movement to avoid mechanical shock damage. This compact-sized pocket meter accurately measures AC and DC voltages, DC current, and resistance.



It also passes the critical safety tests required by Underwriters Laboratories for test equipment, meets UL 3111 Installation Category 1, Pollution Degree 2, and its 2000 ohm/volt sensitivity ensures accurate readings.



Important:

- This meter is not designed for outdoor use.





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- Completely read this manual before you use the meter.
- If you are not familiar with multimeters and testing procedures, we suggest you read *Using Your Meter* (available at your local RadioShack store) before using the meter.

Note: You need one AAA battery (not supplied) to power your multimeter.








A WORD ABOUT SAFETY

We have taken every precaution in designing this meter to ensure that it is as safe as we can make it. But safe operation depends on you, the operator. We recommend that you follow these simple safety rules:



Features

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- Never apply voltages to the meter that exceed the limits given in the specifications. Never apply more than 1000V DC or 1000V AC between any input terminals, or between an input terminal and ground.
- Use extreme caution when working with voltages above 40V. Always disconnect power from the circuit you are measuring before you connect test leads to high-voltage points.
- Never connect the test probes to a source of voltage when the function selector is set to **Rx1K Ω** or **150mA DC**.
- Always discharge any capacitors of the circuit under test before you attach test probes.

- Always turn off power and disconnect the test probes from the circuit you are testing before you replace the meter's battery.
- Never operate the meter unless its battery compartment cover is fully closed with the screw fully tightened.
- Because many AC/DC sets have a potentially hot chassis, be sure the top of your workbench and the floor underneath it are made of non-conductive materials.

This multimeter is fully calibrated and tested. Under normal use, no further adjustment should be necessary except as noted in this Owner's Manual. If the meter requires repair, do not try to adjust it yourself. Take it to your local RadioShack store.

WARNINGS:

- USE EXTREME CAUTION IN USE OF THIS DEVICE. IMPROPER USE OF THIS DEVICE CAN RESULT IN INJURY OR DEATH. FOLLOW ALL SAFEGUARDS SUGGESTED IN THIS OWNER'S MANUAL IN ADDITION TO NORMAL SAFETY PRECAUTIONS IN DEALING WITH ELECTRICAL CIRCUITS. DO NOT USE THIS DEVICE IF YOU ARE UNFAMILIAR WITH ELECTRICAL CIRCUITS AND TESTING PROCEDURES.
- NEVER TRY TO PROBE WITH BOTH TEST LEADS AT THE SAME TIME OR HOLD BOTH TEST LEADS IN ONE HAND.



- USE EXTREME CARE WHILE USING THE METER TO MEASURE CURRENT AND VOLTAGE IN COMMERCIAL ELECTRICAL PANELS. UNLIKE A HOME AC OUTLET, A COMMERCIAL ELECTRICAL PANEL HAS TREMENDOUS CURRENT SURGE POTENTIAL. THIS IS ESPECIALLY TRUE FOR THREE-PHASE INDUSTRIAL ELECTRICAL PANELS. A SMALL SPARK FROM ONE OF THESE PANELS CAN CAUSE A PLASMA EXPLOSION AND FIRE THAT CAN SEVERELY BURN YOU. DO NOT HOLD THE METER WHILE USING IT.
- ALWAYS WEAR PROTECTIVE LEATHER GLOVES, A FACE SHIELD, AND FIREPROOF ARM AND UPPER BODY PROTECTION

WHILE USING THE METER TO MEASURE CURRENT AND VOLTAGE IN COMMERCIAL ELECTRICAL PANELS.

- IF THIS EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.
- TO REDUCE THE RISK OF FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.

SPECIAL PANEL MARKINGS

For your safety, we have added special markings to the meter's panel to remind you of the measurement limitations.

500V MAX 	To avoid electrical shock or damage to the meter, do not connect the ground terminal to any source that exceeds 500 volts with respect to earth ground.
1000V RMS MAX	To avoid electrical shock or damage to the meter, do not connect the test leads to any source that exceeds 1000 volts RMS AC.
	Caution: Risk of electric shock! Refer to the complete operating instructions.



Caution: Be extra careful when making high-voltage measurements. DO NOT TOUCH TERMINALS OR PROBE ENDS.



SPECIFICATIONS

Ranges



AC/DC Voltage 15V, 150V, 1000V
DC Current 150 mA
Resistance 100 K Ω (Center 3.5 K Ω)



Accuracy

DC $\pm 3\%$ of Full Scale
AC $\pm 4\%$ of Full Scale
Resistance $\pm 3\%$ at Full Scale Length
Sensitivity, AC/DC Voltage 2000 Ω /Volt



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Operating Temperature 32 to 109.4°F
(0 to 43°C)



Storage Temperature -4 to 140°F
(-20 to 60°C)

Power Requirement One AAA Battery

Dimensions (HWD) ... 3⁷/₈ × 2¹/₂ × 1¹/₄ Inches
(98 × 64 × 32 mm)

Weight 3.7 oz (105 g)

Specifications are typical; individual specifications might vary. Specifications are subject to change and improvement without notice.



Preparation

INSTALLING A BATTERY

Your meter requires one AAA battery (not supplied) for power. For the best performance and longest life, we recommend a RadioShack alkaline battery.

WARNINGS:

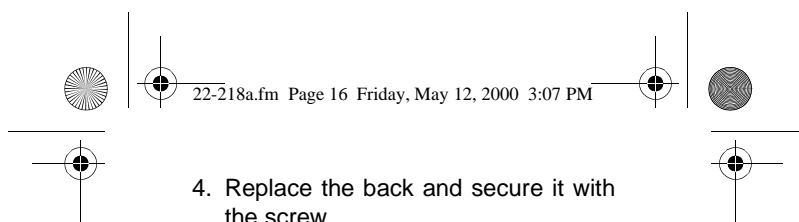
- TO AVOID ELECTRIC SHOCK, DISCONNECT BOTH OF THE METER'S TEST LEADS FROM ANY EQUIPMENT BEFORE YOU INSTALL OR REMOVE THE METER'S BATTERY.
- DO NOT OPERATE YOUR METER UNTIL THE BATTERY IS PROPER-

LY INSTALLED AND THE BATTERY
COMPARTMENT COVER IS IN
PLACE AND SECURED.

Caution: Use only a fresh battery of the
required size and recommended type.

Follow these steps to install the battery.

1. Set the function selector to **OFF** to
turn off the meter if it is on. Then
remove the test leads from all test
circuits.
2. Use a Phillips screwdriver to remove
the screw on the back of the meter,
then remove the back of the meter.
3. Install the battery in the compart-
ment as indicated by the polarity
symbols (+ and -) marked inside.

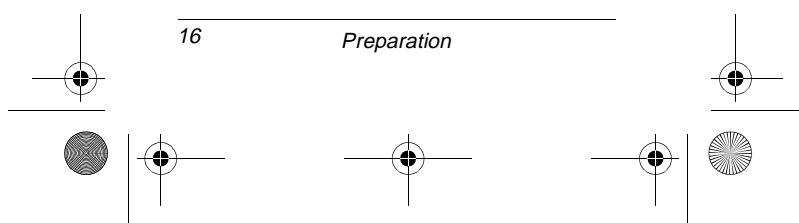


4. Replace the back and secure it with the screw.

When you cannot adjust the pointer to 0 on the scale when you measure resistance (see "Measuring Resistance" on Page 29) or the meter stops operating properly, replace the battery.

Warning: Dispose of old batteries promptly and properly. Do not burn or bury them.

Caution: If you do not plan to use the meter for a month or more, remove the battery. Batteries can leak chemicals that can destroy electronic parts.



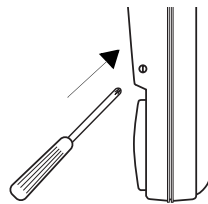
CONNECTING THE TEST LEADS

The test leads supplied with your meter are rated for 1000 volts. Only use test leads of the same rating with the meter. You can order replacement leads from your local RadioShack store.

Plug the red test lead's right-angled end into the meter's + jack, then plug the black test lead's right-angled end into the meter's – jack.

ZERO ADJUSTMENT

If the pointer does not normally rest exactly over 0 at the left side of the **ACV/DC VmA** scale, use a flat-head screwdriver to adjust the plastic screw on the center of the right side of the tester face to set the pointer to 0.







Using the Meter



WARNING: DO NOT TRY TO MEASURE VOLTAGE GREATER THAN 1000V DC/1000V AC.

Caution: When the meter is not in use, always leave the function selector set to **OFF**.

To use the meter, use the function selector to switch between the meter's func-





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tions. Then connect the test leads to the circuit you want to measure.



MAKING MEASUREMENTS

For the most accurate reading, the air temperature should be between 43°F and 74°F (6°C and 23°C) with an 80% maximum relative humidity.








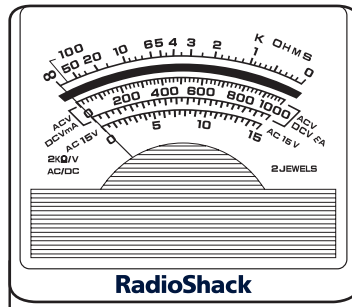
Keep the meter lying flat on a non-metallic surface. Also, use a range setting that results in a reading in the upper third of the meter scale.

For exact readings, look at the scale from an angle where the pointer and its reflection in the mirror come together.



Using the Meter 19





MEASURING DC/AC VOLTAGE

WARNINGS:

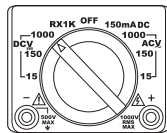
- NEVER CLAMP A LEAD TO A HOT WIRE (USUALLY RED, BLACK, OR BLUE IN AC WIRING CIRCUITS). IF ONE LEAD IS CLAMPED TO A HOT

WIRE AND YOU TOUCH THE METER'S OTHER PROBE, YOU COULD RECEIVE AN ELECTRIC SHOCK.

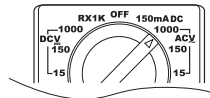
- THE MAXIMUM INPUT LIMIT FOR VOLTAGE MEASUREMENT IS 1000V DC or 1000V AC. TO AVOID ELECTRICAL SHOCK AND DAMAGE TO THE METER, NEVER TRY TO MEASURE DC VOLTAGE ABOVE 1000 VOLTS OR AC VOLTAGE ABOVE 1000 VOLTS.
- TO AVOID ELECTRICAL SHOCK AND DAMAGE TO THE METER, NEVER CONNECT THE TEST PROBE PLUGGED INTO THE — JACK TO A SOURCE OF VOLTAGE ABOVE 500 VOLTS.

Follow these steps to measure DC or AC voltage.

1. Set the function selector to one of the **DC V** positions (to measure DC voltage) or to one of the **AC V** positions (to measure AC voltage).



DC V



AC V

Note: If you are not certain about the voltage level, set the function selector to **1000 DCV** or **1000 ACV**. Then keep trying the next lowest range (as necessary) until the reading appears in the upper third of the meter scale.

2. Touch the test leads to the circuit you want to test, then read the DC or AC voltage on the scale.

Hint: When you use the meter to probe for a voltage in a high-voltage circuit, we recommend you do not try to position both test leads at once. Instead, use an insulated alligator clip (not supplied) to clamp one test lead to the circuit's neutral or ground lead (usually a bare, green, or white lead in AC wiring circuits). Then place your free hand in your pocket or behind your back and probe for voltages with the other test lead. This helps prevent you from accidentally touching a hot wire, since you need only concentrate on one test lead.

MEASURING 3-PHASE AC VOLTAGE

Warning: Because of the dangers inherent in measuring three-phase circuits, we strongly recommend you do not use this meter for such applications.

If you want to measure 3-phase, line-to-line voltages, please note that the actual voltage can be greater than the circuit's rated line-to-ground voltage.

To determine if a line-to-line 3-phase voltage exceeds the rating of this meter, multiply the rated line-to-ground voltage by 1.732 (the square root of 3). For example, if the rated line-to-ground voltage is 600 volts, the line-to-line voltage is $600 \times 1.732 = 1039.2 \text{ V AC}$. This voltage exceeds the meter's rating. Therefore, you should not connect the meter to this cir-

cuit or to any equipment connected to the circuit. Doing so could present a dangerous shock hazard to you, and could also damage the meter.

If you do not know why there is a voltage difference, you should not be working on 3-phase power circuits. These circuits are generally extremely powerful and very dangerous. Special safety equipment should be worn when working around these dangerous circuits.

MEASURING AC VOLTAGE ON A DC SOURCE BIAS

When an AC voltage has been superimposed on a DC source bias, you cannot take ordinary measurements. The readings wander on the scale and are not accurate. To measure an AC voltage

superimposed on a DC voltage source bias, you must first measure the DC and AC voltages separately, then compute the peak voltage using this formula:

$$\text{Peak voltage} = \text{DC voltage} + \frac{\text{AC voltage}}{.707}$$

WARNINGS:

- TO AVOID INJURY OR DAMAGE TO YOUR METER, NEVER TRY TO MEASURE AN AC VOLTAGE THAT IS RIDING ON A DC SOURCE BIAS WHERE THE PEAK VOLTAGE EXCEEDS 100V WITH RESPECT TO EARTH GROUND.
- TO AVOID INJURY OR DAMAGE TO YOUR METER, NEVER TRY TO MEASURE ANY VOLTAGE MORE

THAN 30V AC ON A DC SOURCE
BIAS.

1. To measure DC voltage, set the function selector to one of the **DC V** positions. Then touch the test leads to the circuit you want to test. The scale shows the DC voltage.
2. Disconnect the test leads from the circuit.
3. To measure the AC voltage, set the function selector to one of the **AC V** positions, then connect a 0.1 microfarad/100 V polyester film capacitor in series with the positive terminal of the voltage source and the positive (+) test lead.

-

2. Remove power from the circuit under test and discharge all capacitors.
3. Break the electrical path for the circuit in which you want to measure current. Then connect the negative (–) test lead to the negative side and the positive (+) test lead to the positive side of the circuit.
4. Apply power and read the current.

MEASURING RESISTANCE

The resistance measuring circuit in your meter compares the voltage gained through a known resistance (internal) with the voltage developed across an unknown resistance.

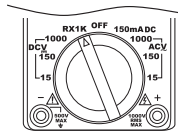
WARNING: BE SURE THE CIRCUIT UNDER TEST HAS ALL POWER RE-



MOVED AND ANY ASSOCIATED CAPACITORS ARE FULLY DISCHARGED BEFORE YOU MAKE A RESISTANCE MEASUREMENT.

Caution: Never connect the test leads to a source of voltage while the selector is set to **Rx1K Ω** .



Follow these steps to measure resistance.



1. Set the function selector to **Rx1K Ω** .
2. Touch the test leads together then adjust **OHMS ADJUST** on the side of the meter to set the pointer to 0.





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







3. Touch the test leads across the circuit you want to measure, or remove one of the leads of the component you want to measure from its circuit and touch the test leads across the component. Read the results on the scale.






Notes:

- When you try to identify cathode and anode ends or the type of transistor (PNP or NPN), the actual polarity of the meter's voltage is the opposite of the polarity suggested by the test probes' color. The red test probe is the negative source, and the black test probe is positive.
- When you measure the resistance of a component in a circuit, disconnect one side of the component you are



Using the Meter





testing. This prevents other components in the circuit from interfering with the reading.

Care

To care for your RadioShack 8-Range Multimeter so it will serve you for years:

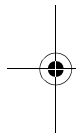
- Keep the meter dry. If it gets wet, wipe it dry immediately.
- Use and store the meter only in normal temperature environments.
- Handle the meter gently and carefully. Do not drop it.
- Keep the meter away from dust and dirt.



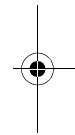
- Wipe the meter with a damp cloth occasionally to keep it looking new.



Modifying or tampering with the meter's internal components can cause a malfunction and might invalidate its warranty. If your meter is not performing as it should, take it to your local RadioShack store for assistance.

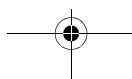


Modifying or tampering with your meter's internal components can cause a malfunction and might invalidate the meter's warranty. If your meter is not performing as it should, take it to your local RadioShack store for assistance.



CLEANING

To keep the meter looking new, occasionally wipe it with a cloth slightly dampened with water. Do not use harsh




chemicals, cleaning solvents, or strong detergents to clean the meter.


WARNINGS:

- DO NOT LET ANY WATER DRIP INSIDE THE METER WHILE CLEANING IT.
- MAKE SURE THAT THE METER IS COMPLETELY DRY BEFORE USING IT.


REPLACING THE FUSE


If the meter does not work, you might need to replace the fuse. If you need to replace the fuse, use a 315 mA, 250V ceramic fuse (available at your local RadioShack store).






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Caution: Do not use a fuse with ratings other than those specified here. Doing so might damage your meter.

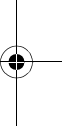
Follow these steps to replace the fuse.


1. Set the function selector to **OFF**, then disconnect the test leads.

WARNINGS:

- DO NOT OPERATE YOUR METER UNTIL THE BATTERY IS PROPERLY INSTALLED AND THE BACK OF THE METER IS IN PLACE AND SECURED.
- TO AVOID ELECTRIC SHOCK, YOU MUST DISCONNECT THE TEST LEADS BEFORE YOU REMOVE THE FUSE.











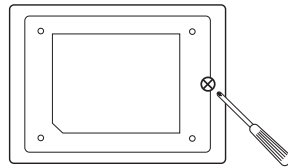


Care

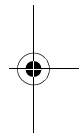
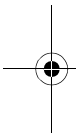
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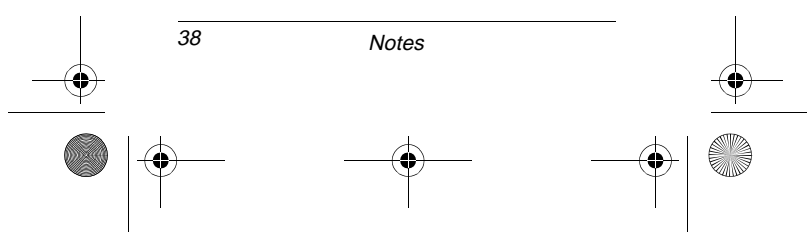
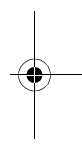
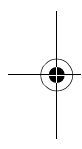
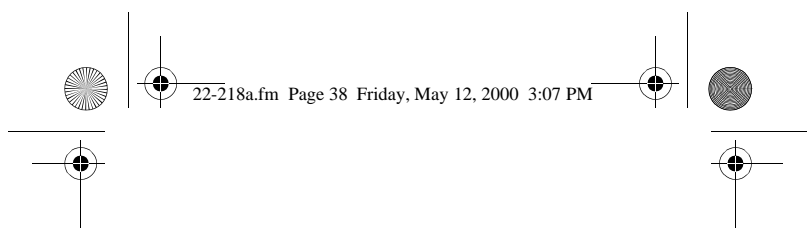






2. Use a Phillips screwdriver to remove the screw on the back of the meter, then remove the back of the meter.
3. Remove the fuse from the clips on the bottom of the meter.
4. If the fuse is blown, replace it with a new 315 mA, 250V ceramic fuse.
5. Replace the battery, then replace the back cover and secure it with the screw.





Limited Ninety-Day Warranty

This product is warranted by RadioShack against manufacturing defects in material and workmanship under normal use for ninety (90) days from the date of purchase from RadioShack company-owned stores and authorized RadioShack franchisees and dealers. EXCEPT AS PROVIDED HEREIN, RadioShack MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES CONTAINED HEREIN. EXCEPT AS PROVIDED HEREIN, RadioShack SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY USE OR PERFORMANCE OF THE PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES RESULTING FROM INCONVENIENCE, LOSS OF TIME, DATA, PROPERTY, REVENUE, OR PROFIT OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF RadioShack HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

In the event of a product defect during the warranty period, take the product and the RadioShack sales receipt as proof of purchase date to any RadioShack store. RadioShack will, at its option, unless otherwise provided by law: (a) correct the defect by product repair without charge for parts and labor; (b) replace the product with one of the same or *(continued)*

(continued) similar design; or (c) refund the purchase price. All replaced parts and products, and products on which a refund is made, become the property of RadioShack. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period.

This warranty does not cover: (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, lightning or other incidence of excess voltage or current; (b) any repairs other than those provided by a RadioShack Authorized Service Facility; (c) consumables such as fuses or batteries; (d) cosmetic damage; (e) transportation, shipping or insurance costs; or (f) costs of product removal, installation, set-up service adjustment or reinstallation.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

RadioShack Customer Relations, 200 Taylor Street, 6th Floor,
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We Service What We Sell

12/99

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